



Touch DNA and Other Sample Types on Rapid DNA

RTI Rapid DNA Technology Forum
August 16, 2017

Sample types run on RapidHIT

Blood



Saliva



Semen,
Hair,
Tissue,
Bone



Generating Rapid DNA Profiles from Crime Scene Samples Commonly Encountered in the United Arab Emirates



RapidHIT System Bibliography

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5. E.L. Romsos, et al., Rapid DNA maturity assessment, *Forensic Sci. Int. Gene. Suppl.* (2015)
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- Dilution Study: sensitivity with blood & saliva samples
- Simulation of crime scene evidence samples:
 - 15 substrates used for deposition of different blood samples; 10 of different saliva and collection methods
- Simulation of summer season conditions

Generating Rapid DNA Profiles from Crime Scene Samples Commonly Encountered in the United Arab Emirates



Samples Run in Duplicate	RapidHIT™	Traditional Method	
	Volume of Blood (µL)	Volume of Blood (µL)	Average Quantity of DNA (ng)
M1 and F1	1.0	1.0	1.2
M1 and F1	0.5	0.5	0.38
M1 and F1	0.25	0.25	0.28
M1 and F1	0.125	0.125	0.18
M1 and F1	0.0625	0.0625	0.15

Table 1: Volumes and quantity of DNA from diluted blood samples for sensitivity study. Five different volumes of blood, ranging from 1.0-0.0625 µL from M1 and F1 samples, run in duplicates using the RapidHIT™ System and the traditional method. The average quantity of DNA using the traditional method ranged from 1.2 to 0.15 ng.

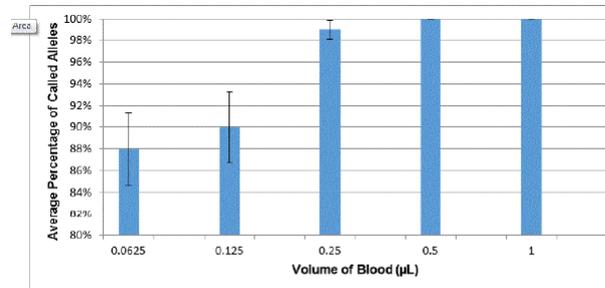


Figure 1: The average percentages of called alleles from five different volumes of blood showing a correlation between the volumes of blood and the percentages of called alleles

Results of the dilution study in duplicate indicated that approximately 0.28 ng of DNA (0.25 µL of blood)

Generating Rapid DNA Profiles from Crime Scene Samples Commonly Encountered in the United Arab Emirates



Samples Run in Duplicate	RapidHIT™	Traditional Method	
	Volume of Saliva (µL)	Volume of Saliva (µL)	Average Quantity of DNA (ng)
Donor 1 and Donor 2	50.0	50.0	977.0
Donor 1 and Donor 2	40.0	40.0	678.8
Donor 1 and Donor 2	30.0	30.0	393.3
Donor 1 and Donor 2	20.0	20.0	65.6
Donor 1 and Donor 2	10.0	10.0	33.3

Table 2: Volumes and quantity of DNA from saliva samples for sensitivity study. Five different volumes of saliva, ranging from 50.0-10.0 µL from Donor 1 and Donor 2, run in duplicates using RapidHIT™ and the traditional method. The average quantity of DNA using the traditional method ranged from 977.0 to 33.3 ng.

Generating Rapid DNA Profiles from Crime Scene Samples Commonly Encountered in the United Arab Emirates



Number	Crime Scene Substrates	Short Name	Collection Method
1	Synthetic leather checkered pattern	Synthetic leather	1.0 cm ² Cut
2	Northern Red Oak branch covered with soil	Branch	Swabbed
3	Pacon paper painted with Crayola washable water colors	Water paint	1.0 cm ² Cut
4	Denim jeans (100% cotton)	Denim jeans	1.0 cm ² Cut
5	Great Value freezer bag (plastic)	Plastic bag	1.0 cm ² Cut
6	Card with Balspar Brand Premium Latex paint	Latex paint	Swabbed
7	Natural Oak Parquet Gunstock Hardwood Flooring	Finished wood	Swabbed
8	Ceramic floor tile	Tile	Swabbed
9	Mexican Beach Pebble Stone covered with soil	Stone	Swabbed
10	Tempered glass piece from a broken car window	Tempered glass	Swabbed
11	Ash tree wood block (unfinished)	Unfinished wood	Swabbed
12	Carpet Home Decorates Collections (2701 CARLSBAD)	Carpet fibers	3 Fibers Cut
13	Arabic Shimagh, Albassam (100% white cotton)	Scarf	1.0 cm ² Cut
14	Pergo XP Ligorla Slate laminate flooring	Laminated flooring	Swabbed
15	Kimberly-Clark® Kimwipe®	Kimwipe	1.0 cm ² Cut

Table 3: Substrates used for deposition of blood and collection method. Fifteen substrates used for deposition of three different blood samples to mimic items of evidence commonly encountered in the indoor crime scenes in the UAE. Short names of the substrates are indicated in the column. The collection methods to gather this body fluid from these substrates are included.

***15 substrates used for deposition of blood samples
Complete profiles obtained despite potential inhibitors***

Generating Rapid DNA Profiles from Crime Scene Samples Commonly Encountered in the United Arab Emirates



Number	Crime Scene Substrates (Saliva)	Short Name	Collection Method
1	Stainless-steel spoon	Stainless-steel spoon	Licked/Swabbed
2	Plastic fork	Plastic fork	Licked/Swabbed
3	Plastic spoon	Plastic spoon	Licked/Swabbed
4	Wrigley 5 [®] Chewing Rain-gum	Minted chewing gum	Chewed/3.0 cm ² Cut
5	Self-adhesive stamp	Stamp	Licked/1.0 cm ² Cut
6	Chromite stone covered with soil	Stone	Spat on/Swabbed
7	Starbucks [®] straw	Straw	Inserted in mouth/1.0 cm ² Cut
8	Adhesive part of self-seal envelope	Envelope	Licked/Swabbed
9	Ice Mountain-bottle of water	Bottle	Inserted in mouth/Swabbed
10	Glidden Trim and Door paint on index card	Oil paint	Spat on/Swabbed

Table 4: Substrates used for deposition of saliva and collection method. Undefined amounts of saliva from two donors deposited on 10 different substrates to mimic items of evidence commonly encountered in the indoor crime scenes in the UAE. Short names of the substrates are indicated in the column. The collection methods to gather this body fluid from these substrates are included.

***10 substrates used for deposition of saliva samples
Complete profiles obtained despite potential inhibitors***

Testing forensics samples with EXT Cartridge on RapidHIT ID

Sample-to-CODIS

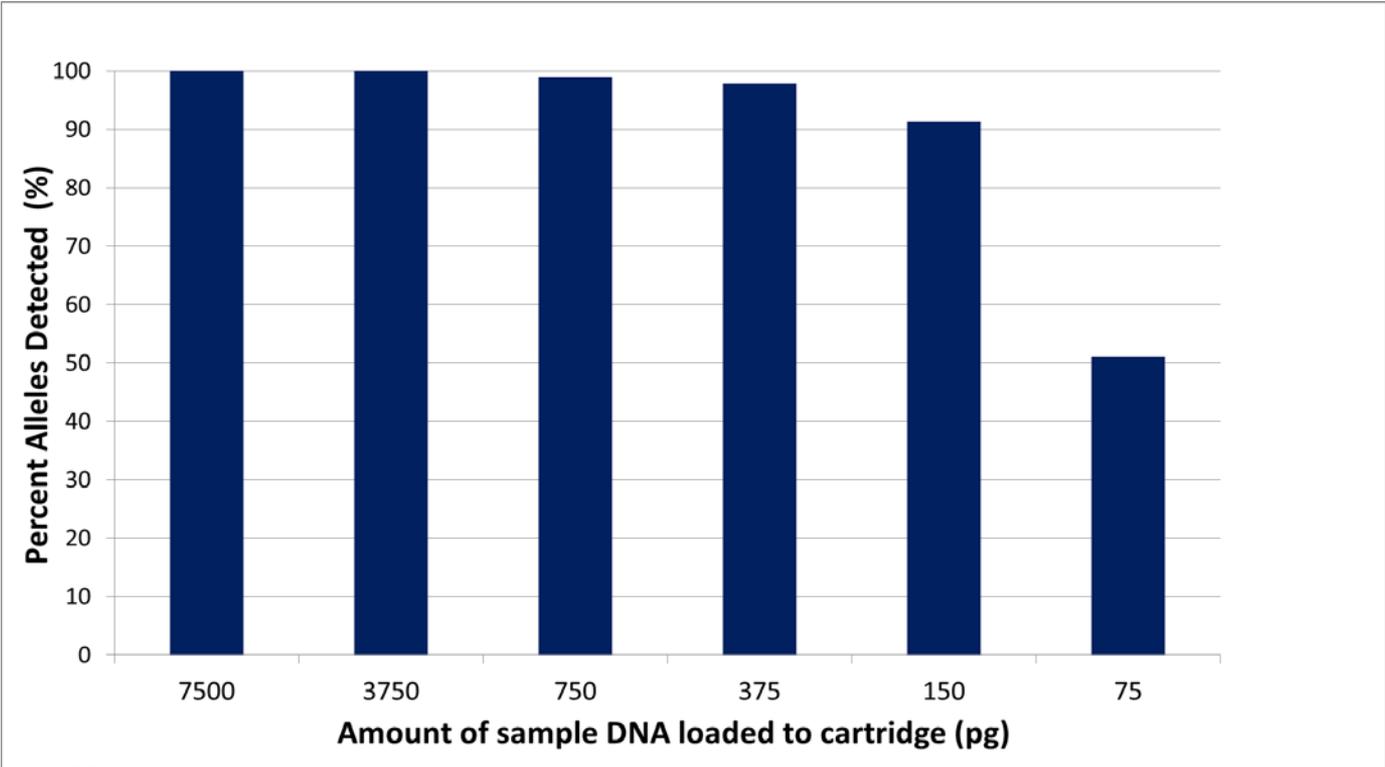
- Buccal swabs



Extracted DNA in a lab

- Blood stains
- Cigarette butt
- Swab of a cup lip
- Swab of a gun

Sensitivity comparable to or better than traditional methods

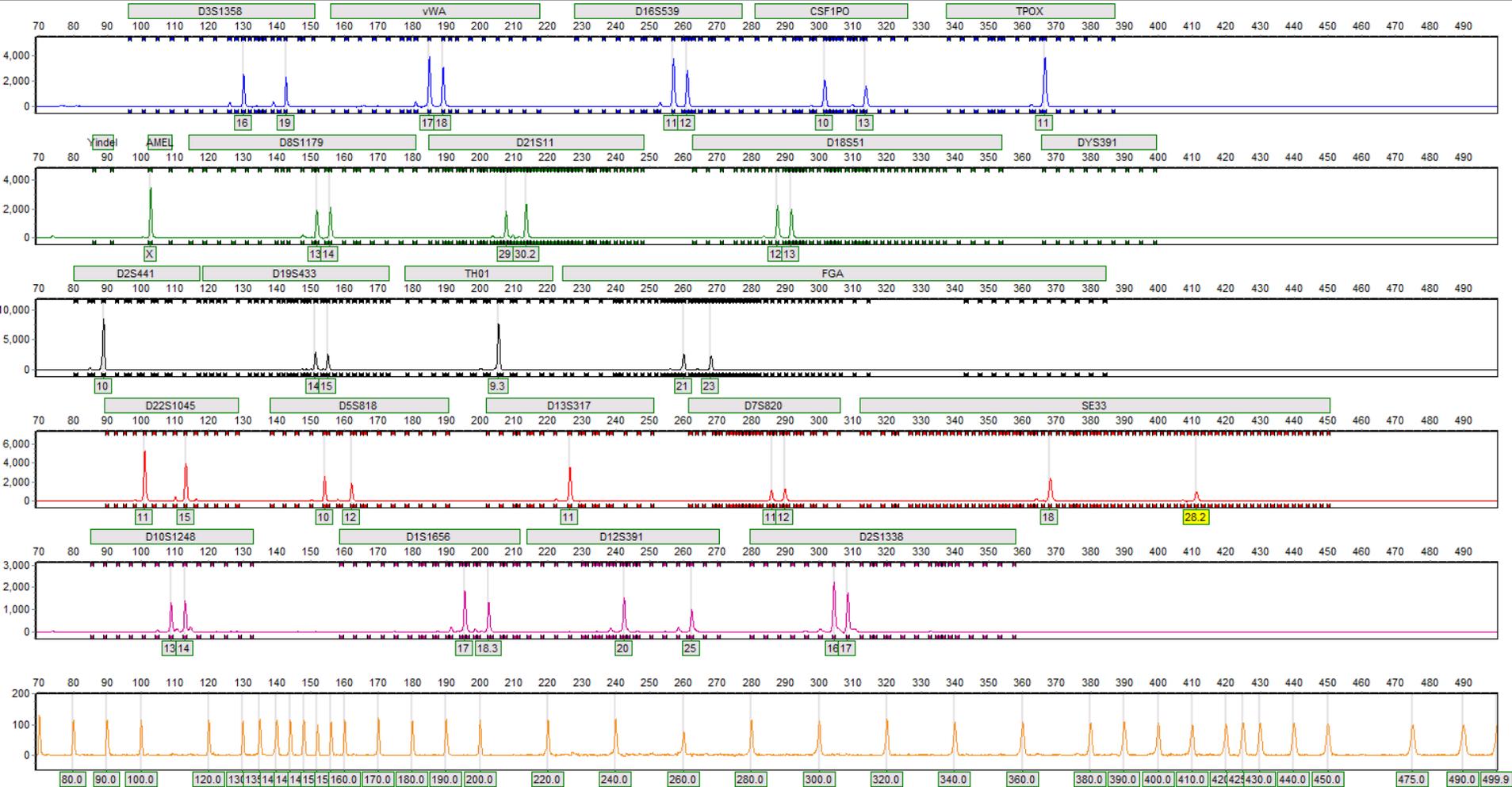


Sensitivity study using human male DNA

Swab of a cup lid – 4 ng total DNA (408 pg/μL)

Sample prepared with PrepFiler and Quantifiler Trio

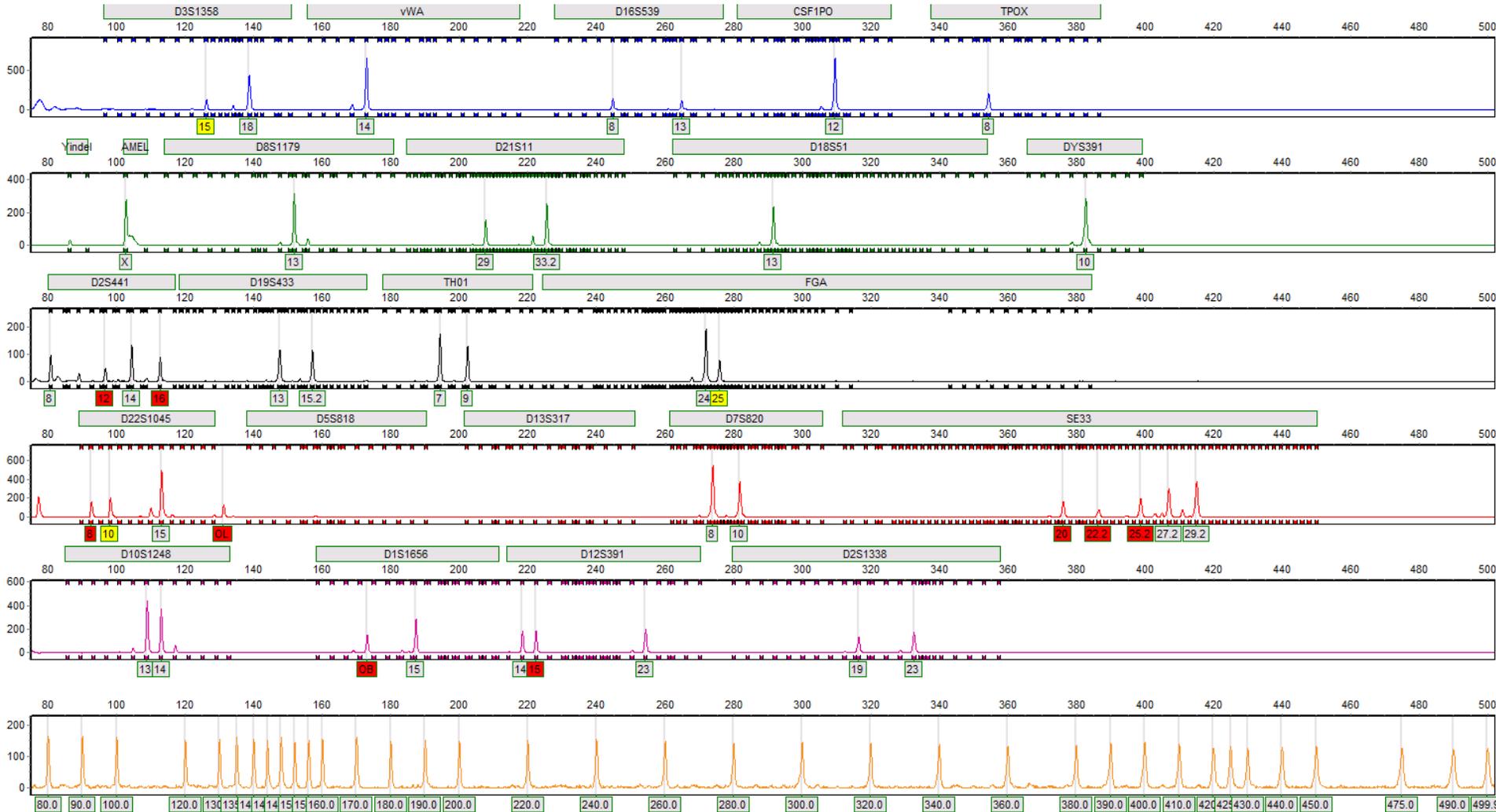
RapidHIT[®]ID^{EXT}



Swab of phone face - 70 pg total DNA (7 pg/uL)

Sample prepared with PrepFiler and Quantifiler Trio

RapidHIT[®]ID^{EXT}

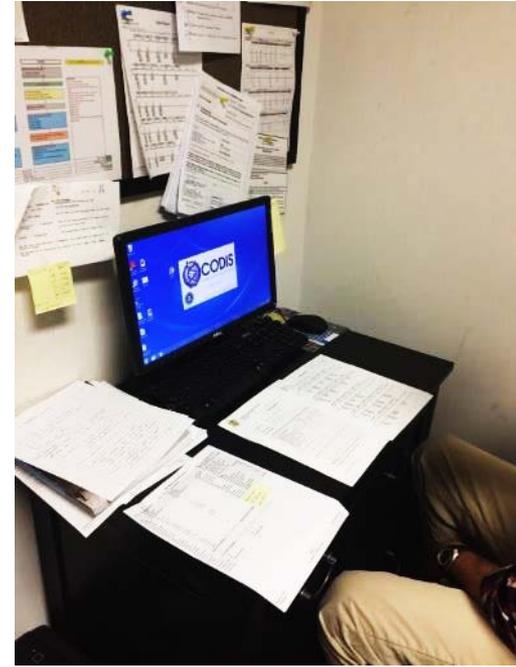




- Victim's body discovered in burnt home
- Bone marrow from clavicle was soaked in buffer, applied to a swab, and processed in the RapidHIT ID ACE cartridge
- 20 of 24 loci identified
- Enabled kinship comparison to victim's brother



CODIS upload with the EXT Sample Cartridge by a lab



Feb 2017: Extracts from a motor vehicle theft (still unsolved) and forcible rape (solved) were analyzed using the RapidHIT ID and EXT Sample Cartridge resulting in full profiles, subsequently uploaded to CODIS

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